Licensing Strategies for the Future Transportation of High Burn Up Spent Nuclear Fuel

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Current Definitions

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- Legislation
  - Disposal
  - Monitored Retrievable Storage
- Regulation
  - Storage (Part 72)
  - Not in Transportation (Part 71)
- Regulatory Guidance
  - ISG -2

Safety Criteria

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- Containment
- Shielding
- Criticality Safety

Safety Barriers

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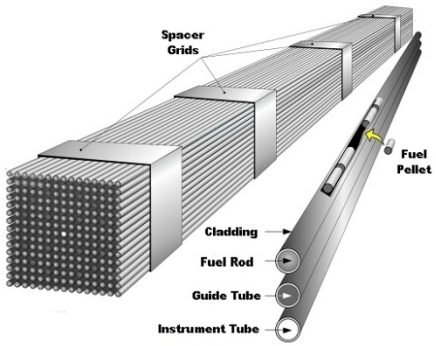
- Cladding
- Canister
- Overpack



Fuel Assembly

Primary Role of Barriers in Meeting Safety Criteria

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	RETRIEVABILITY	CRITICALITY SAFETY	CONTAINMENT	SHIELDING
Current Paradigm				
STORAGE	Individual Assembly	Cladding	Canister	Overpack
TRANSPORTATION	Individual Assembly	Cladding	Overpack	Overpack
Future Paradigm				
STORAGE	Canister	Canister	Canister	Overpack
TRANSPORTATION	Canister	Canister	Overpack	Overpack

Monitoring and Mitigation (Storage)

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	CLADDING	CANISTER	OVERPACK
Ability to Monitor or Confirm	Visual confirmation would likely require canister opening, or penetrations, Could be based on extrapolation from limited data points	Visual inspections possible Physical testing possible, (e.g., ultrasonic testing)	Visual inspections
Ability to Mitigate	Repackaging	Canister could be patched, coated or overpacked	Overpack could be patched Canister could be moved to new overpack

Monitoring and Mitigation (Transportation)

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	CLADDING	CANISTER	OVERPACK
Ability to Monitor or Confirm	Visual confirmation would likely require canister opening, or penetrations Could be based on extrapolation from limited data points	Visual inspections possible at time of loading Physical testing possible, (e.g., ultrasonic testing)	Routine determinations Physical testing possible, (e.g., ultrasonic testing)
Ability to Mitigate	Repackaging	Canister could be patched, coated or overpacked	

Operational Considerations

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Does cladding need to remain intact for:

- Repackaging?
- Reprocessing?
- Disposal?

Condition of Fuel Cladding

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- Determined largely by loading conditions
  - Dryness
  - Drying temperatures
- Reasonable expectation that cladding won't degrade in inert environment
- Difficult to monitor or mitigate once loaded

Conclusion

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- Retrievability in storage and transportation is a policy decision based on:
  - Safety criteria
  - Safety barriers
  - Present and future operational considerations
  - Loading conditions expected to prevent cladding degradation
- Open to change based on new ways of meeting above objectives.